
Use of Abrasive Blasting for Vessel Cleaning at Los Alamos National Laboratory

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Abrasive Blasting

- Abrasive blasting is used extensively for removing corrosion, coatings, paint, or other materials from surfaces.
- Surfaces cleaned by abrasive blasting may range in size from a few nuts and bolt to the exterior of a battleship.
- Concerns have been raised over possible exposure to workers performing abrasive blasting and bystanders from beryllium contained in blasting media (e.g. coal slag).



Abrasive Blasting Studies with Coal Slag

	Beryllium, ug/m ³		Total Dust, mg/m ³	
	minimum	maximum	minimum	maximum
NIOSH 1998	0.86	5.87	not reported	
Meeker 2006	2.50	9.50	1716	9989
NIOSH 2007	0.22	5.30	274	1428

- Reported concentration of beryllium in coal slag media in these studies ranged from 0.28 to 6.3 ppm with a mean of 2.7 ppm.
- PEL for Particulates Not Otherwise Regulated (Total Dust) is 15 mg/m³.
- The problem may not be the amount of beryllium in the blasting media, but rather the control of dust from the blasting operation.

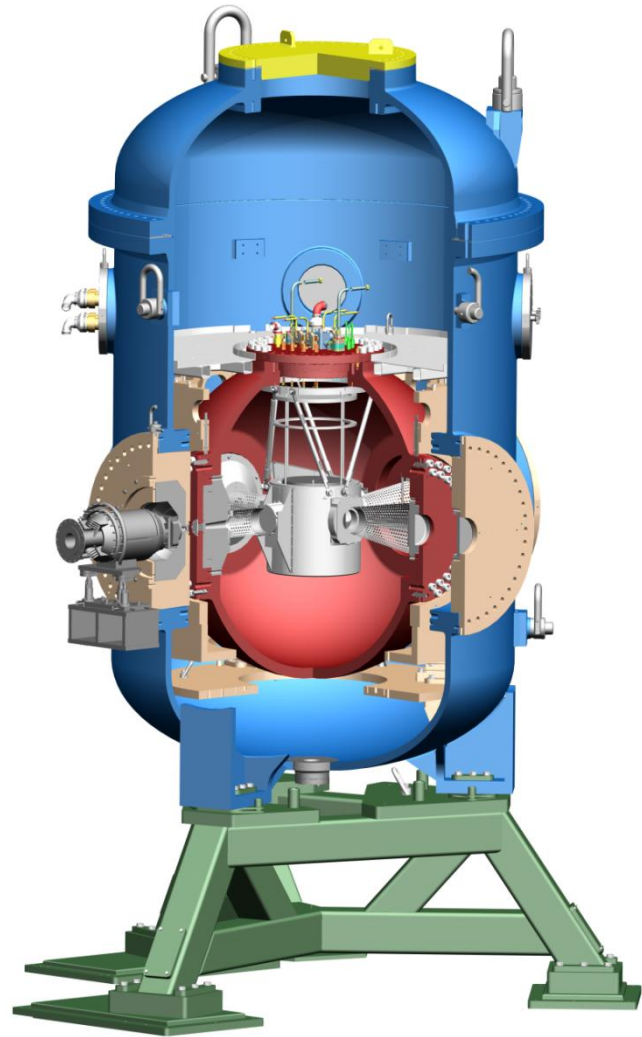
A Hydrodynamic Test



By the time you see this, the data has been collected and the experiment is long over.

Vessel Confinement

- DARHT Dual-Axis Confinement System (DACS).
- Primary vessel (red) contains test device.
- Outer secondary level of containment (blue) serves as cradle for primary vessel.
- Primary vessel lifted out for transport to Vessel Prep Building.



Post-Shot Remains

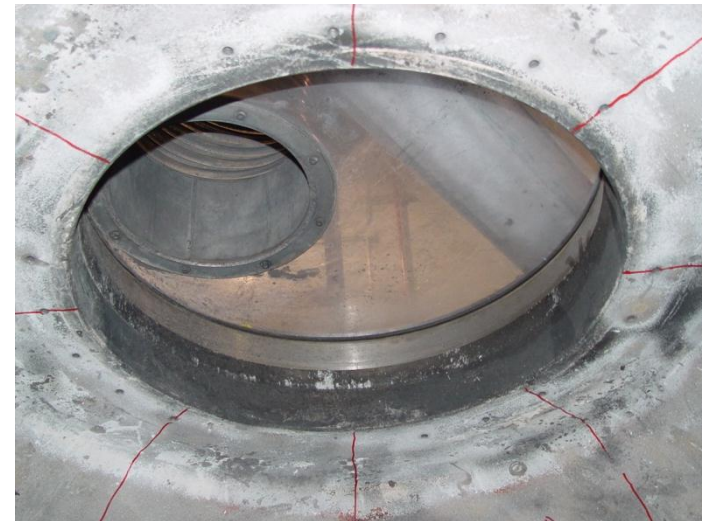


- Experiment converted to fragments and ash.
- Vessel walls covered with impacted fine deposits.

Bag-Out Processes to Contain while Attaching



- Bag-out process to remove covers and install windows and adaptors.
- Ventilation adaptor and light placed on the top portal.
- Vessel positioned against Permacon.
- Covers are cleaned in a ventilated abrasive blasting cabinet.



Removing Vessel Contents in Permacon



- Vessel contents are wetted.
- Large pieces of debris are lifted using tools and washed down before being removed from the vessel and bagged.
- Fine materials are then vacuumed using a HEPA filtered unit with a dropout drum.
- Vessel walls are washed in preparation for abrasive blasting.

Abrasive Blaster with Hood and Dropout Drum



General vessel ventilation rated at 600 cfm. Blaster vacuum rated at 1000 cfm. Vessel volume is approximately 38 ft³. Up to 42 air changes per minute and collecting at point of operation. Robust control system.



Other Abrasive Blasting Concerns

- Cabinets under positive pressure if not vented. Can leak dust.
- Vacuum units may not be HEPA filtered.
- Material being removed may be more hazardous than the abrasive media.



Abrasive Cleaning for Hazardous Contaminates



- Blasting cabinet systems can fail. Exposures when unloading.
- Worker in respirator and PPE as precaution.

References

KTA-Trator, Inc., *Evaluation of Substitute Materials for Silica Sand in Abrasive Blasting*, NIOSH (1998), NTIS # PB99-105553, PB99-140964.

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Crouch, K.G., et al., *Control Technology and Exposure Assessment for Occupational Exposure to Beryllium: Abrasive Blasting with Coal-Slag*, NIOSH (2007), File No: EPHB 263-13a.

Questions



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